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MATH221 CALCULUS I 100pts TEST 1 Spring'11 INSTRUCTOR :CARLA MORRIS
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3pts 1. If $f(x) = 4x^5 - 2x^3 + 9x$ find $f(x^2 + 7x + 6)$ [SET UP ONLY]

$4(x^2+7x+6)^5 - 2(x^2+7x+6)^3 + 9(x^2+7x+6)$

3pts 2. What is the domain of $\frac{3x+5}{x^2-26x+48}$?

$(x-24)(x-2)$

All reals except $x = 2, 24$

4pts 3. Graph $5x - 3y = 15$ See back

4pts 4. Graph $y = x^2 - 8x + 7$ See back

4pts 5. Graph $f(x) = \begin{cases} 2x+7 & -4 \le x < -2 \\ x^2 & x \ge -2 \end{cases}$ See back

IN QUESTIONS 6-8 USE $F(X) = 6X^5 + 10X^3 + 4$ AND $G(X) = 3X^5 - 7X^3 + 8$

3pts 6. Find $(F - G)(X)$ $(6x^5+10x^3+4) - (3x^5-7x^3+8) = 3x^5+17x^3-4$

3pts 7. Find $\left(\frac{F}{G}\right)(X)$ $\frac{6x^5+10x^3+4}{3x^5-7x^3+8}$

4pts 8. Find $(F \circ G)(X)$ $6(3x^5-7x^3+8)^5 + 10(3x^5-7x^3+8)^3 + 4$

4pts 9. If $f(x) = x^2 - 12x + 11$ find $\frac{f(x+h) - f(x)}{h}$

$\frac{[(x+h)^2 - 12(x+h) + 11] - [x^2 - 12x + 11]}{h}$

$\frac{x^2+2xh+h^2-12x-12h+11-x^2+12x-11}{h}$

$\frac{h(2x+h-12)}{h}$

$2x+h-12$

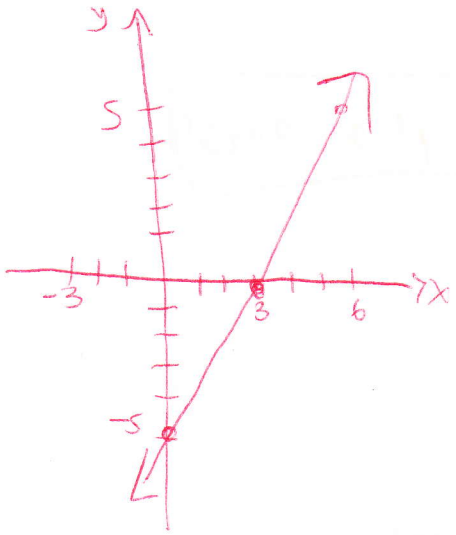
4pts 10. Factor completely $3x^2 - 48x + 189$

$3(x^2-16x+63)$

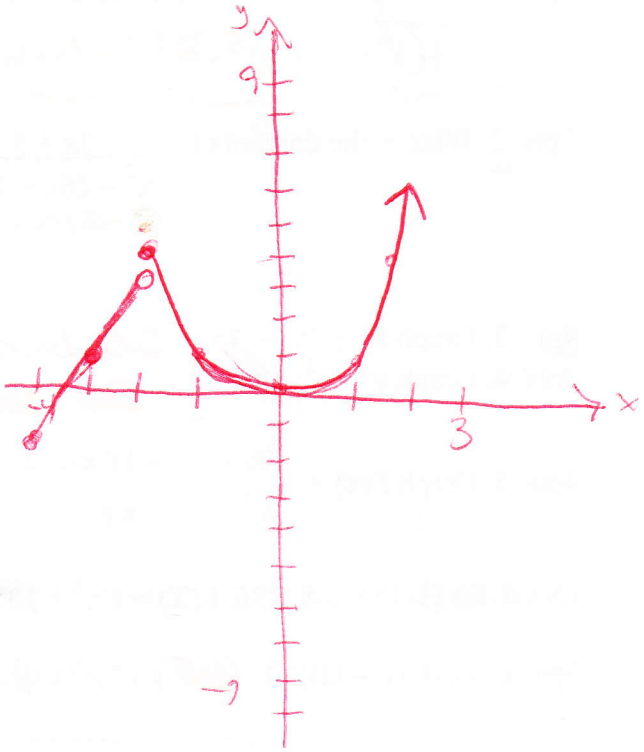
$3(x-7)(x-9)$

(3) $5x - 3y = 15$

3	0
0	-5
6	5



(5) $f(x) = \begin{cases} 2x+7 & -4 \le x < 2 \\ x^2 & x \ge -2 \end{cases}$



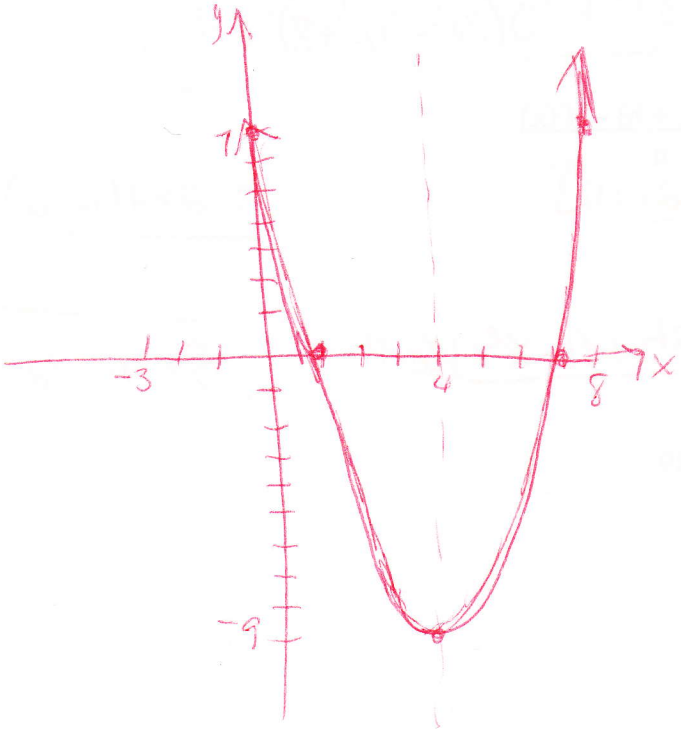
(4) $y = x^2 - 8x + 7$ $(x-7)(x-1)$

x intercepts 1, 7

axis $x = 4$

y intercept 7

$V(4, -9)$



4pts 11. Factor completely $8x^7 - 200x^5$

$8x^5(x^2-25)$

$8x^5(x-5)(x+5)$

4pts 12. Use the quadratic formula to solve $3x^2 = 7x + 20$

$3x^2-7x-20=0$ $x = \frac{7 \pm \sqrt{49-4(3)(-20)}}{2(3)} = \frac{7 \pm 17}{6}$ $x = 4 \text{ or } -\frac{5}{3}$

4pts 13. Find the points where $y = 2x + 15$ and $y = 2x^2 - 3x - 10$ intersect

$2x+15 = 2x^2-3x-10$

$2x^2-5x-25=0$

$(2x+5)(x-5)=0$

$x = -5/2$ or 5

and $(5, 25)$ $(-5/2, 10)$

4pts 14. Simplify using the laws of exponents $\frac{-34x^8y^5z^5}{2x^{-4}y^{11}z}$

$\frac{-17x^{12}z^4}{y^6}$

3pts 15. Simplify $(27/16)^{3/4}$

$\left(\sqrt[4]{81/16}\right)^3 = \left(\frac{3}{2}\right)^3 = 27/8$

4pts 16. Suppose you have a rectangle of length 4 times its height **h**. Write an equation expressing the fact that the area is 256 square centimeters.

$h(4h) = 256$

$4h^2 = 256$

4pts 17. Write an equation of a line with slope 3/5 passing through (10, -3)

$y+3 = 3/5(x-10)$

4pts 18. Find the equation of the line that passes through (7, 9) and (10, 15)

$m = \frac{15-9}{10-7} = \frac{6}{3} = 2$ $\quad y - 9 = 2(x-7)$

4pts 19. Find the equation of the line passing through (2, 9) and is parallel to $3x + 2y = 12$

$2y = -3x + 12$
$y = -\frac{3}{2}x + 6$ $\quad m_{par} = -\frac{3}{2}$ $\quad y - 9 = -\frac{3}{2}(x-2)$

4pts 20. Find the equation of the tangent line to the graph of $y = x^2$ at the point where $x = -3$

pt $(-3, 9)$

$2x|_{x=-3} = -6 = m$ $\quad y - 9 = -6(x+3)$

4pts 21. If $f(x) = 11x + 3$ find the derivative

11

4pts 22. If $f(x) = \frac{1}{x^3}$ find $f'(x)$ $\quad x^{-3}$

$-3x^{-4}$

4pts 23. If $f(x) = x^3$ find $f'(2)$

$3x^2|_{x=2}$ $\quad 12$

5pts 24. Using $f'(a) = \lim_{x \to a} \frac{f(x) - f(a)}{x - a}$ find $f'(x)$ when $f(x) = x^2 + 9x - 3$

$\lim_{x \to a} \frac{(x^2+9x-3) - (a^2+9a-3)}{x-a}$ $\quad \lim_{x \to a} \frac{(x-a)(x+a) + 9(x-a)}{x-a}$ $\quad f'(x) = 2x + 9$

$\lim_{x \to a} \frac{(x^2-a^2) + (9x-9a)}{x-a}$ $\quad \lim_{x \to a} x + a + 9 = 2a + 9$

$(x-4)(x-1)$

4pts 25. Find $\lim_{x \to 2} 2x^3 + 9x^2 - 30$

$2(2)^3 + 9(2)^2 - 30$
$16 + 36 - 30$
22

4pts 26. Find $\lim_{x \to 1} \frac{x^2 - 5x + 4}{x - 1}$

$\frac{1-5+4}{1-1} = \frac{0}{0}$ indet

$\lim_{x \to 1} (x-4) = -3$

formulas

$y - y_1 = m(x - x_1)$ $\quad ax + by = c$ $\quad y = mx + b$ $\quad m_1 = m_2$

$m_1 = -1 / m_2$ $\quad \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $\quad m = \frac{y_2 - y_1}{x_2 - x_1}$