Review for Quiz 1.5 – 1.7 Name_____

NO GRAPHING CALCULATOR

For #1-5, use $f(x) = -x^2 - 2x + 3$

1. Find the first derivative.

$f'(x) = -2x - 2$

2. Find the interval(s) where $f(x)$ is increasing and decreasing.

$-2(-2) - 2 = 2$

$-2(0) - 2 = -2$

inc: $(-\infty, -1)$

dec: $(-1, \infty)$

3. Find the extreme point(s).

$0 = -2x - 2$

$2 = -2x$

$x = -1$

$-(-1)^2 - 2(-1) + 3$

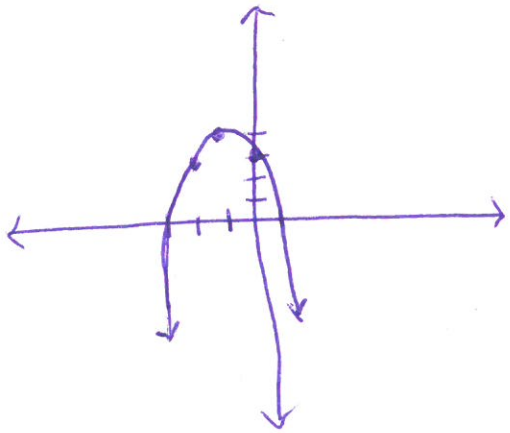
$y = -1 + 2 + 3$

$(-1, 4)$

4. Find the y-intercept.

$(0, 3)$

5. Graph $f(x)$ using the answers above.

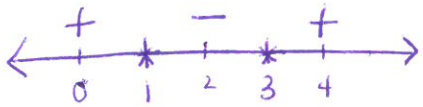


For #6-12, use $f(x) = 2x^3 - 12x^2 + 18x - 5$

6. Find the first derivative.

$f'(x) = 6x^2 - 24x + 18$

7. Find the interval(s) where $f(x)$ is increasing and decreasing.



inc. $(-\infty, 1)$ and $(3, \infty)$

dec. $(1, 3)$

8. Find the extreme point(s).

$0 = 6(x^2 - 4x + 3)$

$0 = 6(x-3)(x-1)$

$-3 \quad 3$

$-4 \quad -1$

$x - 3 = 0 \quad x = 3$

$x - 1 = 0 \quad x = 1$

$(3, -5)(1, 3)$

min max

9. Find the second derivative.

$f''(x) = 12x - 24$

10. Find the inflection point(s) of $f(x)$.

$0 = 12(x - 2)$

$x - 2 = 0 \quad x = 2$

$(2, -1)$

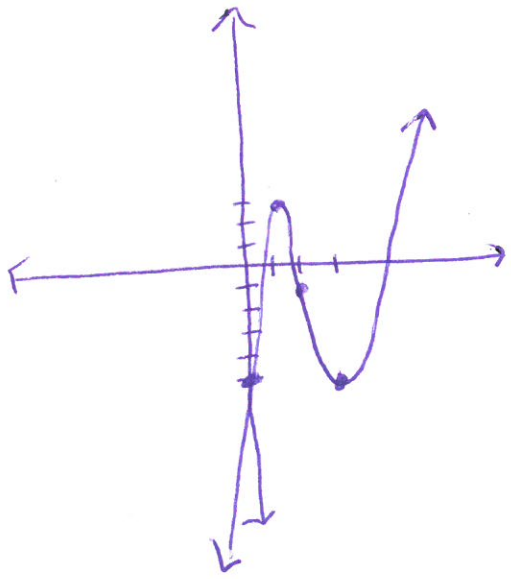
concave down $(-\infty, 2)$

concave up $(2, \infty)$

11. Find the y-intercept.

$(0, -5)$

12. Graph $f(x)$ using the answers above.



Solve the following problems using derivatives. Show all work.

13. The height of a baseball t seconds after being hit is given by $h(t) = -16t^2 + 80t + 3$ What is the maximum height that the baseball reaches, and when does this occur?

$h'(t) = -32t + 80$

$0 = -32(t - 2.5)$

$t - 2.5 = 0$

$t = 2.5$ s

$-16(2.5)^2 + 80(2.5) + 3$

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14. Mr. Sacco and Mrs. Pischke are going to retire early and open a hot dog stand. The current owner now charges \$2 per hot dog and gets approximately 56 customers during the lunch hour. Being the superior math minds that they are, Mr. Sacco and Mrs. Pischke want to figure out how to maximize their profits. The do some research and understand that for every \$0.50 they raise the price of the hot dogs, they will lose 2 customers.

What is the **maximum amount they can charge** per hot dog so their income is maximized and **what is that maximum income**?

\$ #cust = income

$(2 + 0.5x)(56 - 2x) = I(x)$

$112 - 4x + 28x - x^2$

$112 + 24x - x^2 = I(x)$

$I'(x) = -2x + 24$

$0 = -2(x - 12)$

$x = 12$

$-(12)^2 + 24(12) + 112$

256

12 increases @ \$0.50 each

\$6.00 increase

∴ \$8 per hot dog

\$256 income