

16 Oct Recitation Worksheet for MA141

1. Approximate the following values using linear approximation techniques. (Recall, if $L(x) = f(a) + f'(a)(x - a)$ then L approximates $f(x)$ for values of x near a .)

- (a) Approximate $f(0.7)$ where $f(x) = \frac{x^{3/2}}{x+1}$
- (b) Approximate $\sqrt{1.2}$
- (c) Approximate $\cos(\frac{\pi}{2} + .2)$

2. Find the absolute max and absolute min of the following functions over the given interval. Are the answers found absolute, local, or neither over the entire domain of the function?

- (a) $s(t) = 2t^2 - 28t + 80$ for $2 \leq t \leq 8$
- (b) $g(x) = x^3 - 3x^2 - 24x$ for $-5 \leq x \leq 0$
- (c) $f(t) = 4 \sin(t)$ for $0 \leq t \leq 2\pi$
- (d) $h(x) = \frac{1}{3}x^3 - 4x^2 + 7x$ for $x \in [0, 9]$.
- (e) $h(x) = \frac{1}{3}x^3 - 4x^2 + 7x$ for $x \in [-3, 12]$.
- (f) $f(x) = \frac{2}{3}x - 5$ for $-2 \leq x \leq 3$
- (g) $F(x) = -\frac{1}{x^2}$ for $x \in [0.5, 2]$

3. Find all critical points, points of inflection, x and y intercepts, and extrema of the following functions:

- (a) $f(x) = 2x^3 - 12x^2 + 18x$
- (b) $f(t) = \sin(2t + 1)$

4. Let $f(x) = x^4 - 81x^2$. Give the intervals over which f satisfies the following:

- (a) $f(x) > 0$
- (b) $f'(x) < 0$
- (c) $f(x)$ is concave down
- (d) $f'(x)$ is increasing

5. A ball is moving along a horizontal line with position function

$$s(t) = 2t^3 - 14t^2 + 22t - 5, \quad t \geq 0.$$

- (a) When is the ball moving forward? When backward?
- (b) When is the ball accelerating forward? When backward?
- (c) Interpret what the absolute minimum of this graph over $t \geq 0$ means.